12-13 Nov 2014 Isotope S&T Review - Homework

- 1. What are the approximate costs per week of each of the five presented modes of BLIP operation (slide 7 of Thomas Roser's presentation)? (P. Pile)
- 2. How do the 2013 and 2014 costs compare to budget allocations (slide 38 of Suzanne Smith's first presentation)?
- 3. Provide a list of peer-reviewed publications since the last program review.
- 4. Provide worker dose data for the last 3 years.
- 5. Provide two examples of procedure changes and identify how integrated safety management/integrated work management were applied to those changes.

5 Distinct Operating/Cost Modes for BLIP Operations

<u>Mode</u>	<u>Description</u>	<u>Cost Algorithm</u>
1	Dedicated Running	BLIP assumes all start-up and operating costs including operators needed in MCR
2	RHIC Polarized Proton Running	BLIP runs continuously. Higher tube currents for BLIP increase tube replacement component of the rate. Linac start up cost paid by RHIC
3	NSRL Running with Tandem or EBIS	NSRL runs 12 hour day shift/no weekends. BLIP assumes all start-up costs, overnight and weekend operating costs.
4	NSRL Running with Linac in parallel with RHIC pp Setup	NSRL runs 12 hour day shift/no weekends. BLIP assumes all overnight and (if appropriate) weekend operating costs. Linac start up costs paid by RHIC.
5	RHIC Heavy Ion Running	BLIP pays dedicated costs associated with Linac operations and tube use. RHIC Program pays MCR labor cost.

- In addition to modes, costs also vary with Linac energy used.
- Consider to have cost also depend on Linac beam intensity since Linac tube failures increase with beam intensity
- RHIC maintains a five-year inventory of Linac tubes to be able to respond to the single vender going out-of-business. The present inventory is larger than needed for RHIC alone. The extra inventory should be maintained by the isotope program.

BLIP Rate Components by Operating Mode

<u>Mode</u>	<u>Description</u>	<u>Power</u>	Tube Replacement	Linac Maintenance	MCR Labor
1	Dedicated Running		Weekly cost of tube usage based on purchase	40 hours per week for technical support. Misc trade labor and materials based on historical data for Linac maintenance	168 hours per week for Main Control Room Operator
2	RHIC Polarized Protons		history and estimated	Paid by RHIC Program	Paid by RHIC Program
3	NSRL with Tandem	Power use estimated for each of 4 operating energy levels. BNL balanced billing power rates utilized.	hourly lifetime by tube for each of 6 tube types. Number of tubes in use varies by type for each of 4 operating energy levels. Modes 2 and 4	40 hours per week for technical support. Misc trade labor and materials based on historical data for Linac maintenance	112 hours per week for Main Control Room Operator
4	NSRL with Linac		share cost of tubes with RHIC.	40 hours per week for technical support. Misc trade labor and materials based on historical data for Linac maintenance	56 hours per week for Main Control Room Operator
5	RHIC Heavy Ions			Paid by RHIC Program	Paid by RHIC Program

Q:\BLIP & Isotope Program\FY14\[BLIP Beam Cost Worksheet FY14-Final.x\s]\\$\text{SUMMARY SHEET} \\ \text{Power rate @ \$62\text{MwH}} \\ \text{October 2013} \text{-December 2013} \\ \text{December 2013} \\ \text{Operating Mode:} \\ \text{Operating Mode:} \\ \text{MW} \text{\$\text{MwH}\$ Cost\text{Week} \\ \text{Vost} \text{Vost} \\ \text{MW} \text{\$\text{\$\text{MwH}\$ Cost\text{Week} \\ \text{Vost} \text{Vost} \\ \text{Dedicated Running, RHIC in "stand by"(1)} \\ \text{200MeV OPS} \text{ 1.9} \\ \text{62} \text{ 21,2851} \\ \text{95,512} \\ \text{21,204} \\ \text{110,293} \\ \text{111,494} \\ \text{699,37} \\ \text{139MeV OPS} \\ \text{1.36} \\ \text{62} \\ \text{11,580} \\ \text{90MeV OPS} \\ \text{1.36} \\ \text{62} \\ \text{14,158} \\ \text{67,542} \\ \text{21,204} \\ \text{110,2904} \\ \text{612,52} \\ \text{168,961} \\ \text{10,050} \\ \text{118 ImeV OPS} \\ \text{1.48} \\ \text{139MeV OPS} \\ \text{0.44} \\ \text{10,050} \\ \text{139MeV OPS} \\ \text{1.9} \\ \text{62} \\ \text{1.936} \\ \text{62} \\ \text{14,158} \\ \text{67,542} \\ \text{21,204} \\ \text{110,2904} \\ \text{612,52} \\ \text{168,961} \\ \text{10,050} \\ \text{131 MeV OPS} \\ \text{1.48} \\ \text{139MeV OPS} \\ \text{0.44} \\ \text{10,2904} \\ \text{612,52} \\ \text{168,961} \\ \text{131 MeV OPS} \\ \text{0.44} \\ \text{10,2904} \\ \text{612,52} \\ \text{168,961} \\ \text{131 MeV OPS} \\ \text{0.44} \\ \text{10,2904} \\ \text{10,2904} \\ \text{612,52} \\ \text{168,961} \\ \text{10,050} \\ \text{131 MeV OPS} \\ \text{0.44} \\ \text{10,2904} \\ \text{612,52} \\ \text{131 MeV OPS} \\ \text{0.44} \\ \text{10,2904} \\ \text{612,52} \\ \text{133,060} \\ \text{133,080} \\ \text{133,080} \\ \text{133MeV OPS} \\ \text{0.44} \\ \text{10,2904} \\ \text{11,2904} \\ \text{10,2904} \\ 10												
Power rate @ \$62/MwH October 2013 December 2013	2014 BLIP Operating Cost Worksheet											
Operating Mode: POWER	Q:\BLIP & Isotope Program\FY14\[BLIP Be	am Cost V	Norksheet FY1	4-Final.	xis]SUMM/	ARY SHEET						
Operating Mode: POWER												
Operating Mode: POWER POWER Maintenance Operations Total Weekly Start-up												
Operating Mode: POWER POWER Maintenance Operations Total Weekly Start-up			Power rate @ 9	\$62/MwF	1	October 2013	- December 20	13				
Operating Mode: POWER POWER Maintenance Operations Total Weekly Start-up												
Operating Mode: POWER POWER Maintenance Operations Total Weekly Start-up												Ш
MW SiMWH CostWeek wage&mat1 Support Cost hourly cost Cost									(includes G&A)	(includes G&A)	(includes G&A)	▜▔
MW SMWH Cost-Week wage&mart Support Cost hourly cost Cost Dedicated Running, RHIC in "stand by"(1) 200MeV OPS 2.19 62 22,851 95,512 21,204 119,567 830,75 212,687 139MeV OPS 1.69 62 17,560 78,730 21,204 111,494 699.37 186,090 116MeV OPS 1.59 62 15,953 73,136 21,204 110,293 656,50 177,872 190MeV OPS 1.36 62 14,158 67,542 21,204 102,904 612,52 168,961 66MeV OPS 1.19 62 12,363 61,948 21,204 95,515 568,54 160,050 190,050 181MeV OPS 0.51 62 5,344 49,751 - 55,096 327,95 - 181MeV OPS 0.49 62 5,075 44,437 - 49,512 294,71 - 139MeV OPS 0.46 62 4,547 28,494 - 33,041 196,67 - 116MeV OPS 0.49 62 4,547 28,494 - 33,041 196,67 - 116MeV OPS 0.49 62 4,547 28,494 - 33,041 196,67 - 116MeV OPS 0.49 62 4,547 28,494 - 33,041 196,67 - 116MeV OPS 0.49 62 4,547 28,494 - 33,041 196,67 - 116MeV OPS 0.49 62 4,547 28,494 - 33,041 196,67 -	Operating Mode:				POWER	POWER	Maintenance	Operations	Total Weekly		Start-up	П
139MeV OPS 1.69 62 17,560 78,730 21,204 117,494 699.37 186,090 116MeV OPS 1.53 62 15,953 73,136 21,204 110,293 656.50 177,872 90MeV OPS 1.19 62 12,363 61,948 21,204 95,515 568.54 160,050 179,872 179				MW	\$/MWH	Cost/Week	wage&mat'l		Cost	hourly cost	Cost	ПП
116MeV OPS 1.53 62 15.953 73,136 21,204 110,203 656.50 177,872	Dedicated Running, RHIC in "stand by"(1)		200MeV OPS	2.19	62	22,851	95,512	21,204	139,567	830.75	212,687	
90MeV OPS			139MeV OPS	1.69	62	17,560	78,730	21,204	117,494	699.37	186,090	ПП
66MeV OPS			116MeV OPS	1.53	62	15,953	73,136	21,204	110,293	656.50	177,872	ПП
(1) BLIP assumes all operating costs including a 6 operator shift rotation in the MCR. RRIIC Polarized Proton Running (2)			90MeV OPS	1.36	62	14,158	67,542	21,204	102,904	612.52	168,961	ПП
(1) BLIP assumes all operating costs including a 6 operator shift rotation in the MCR. RHIC Polarized Proton Running (2)			66MeV OPS	1.19	62	12,363	61,948	21,204	95,515	568.54	160,050	П
181MeV OPS 0.49 62 5,075 44,437 . 49,512 294.71 . 139MeV OPS 0.46 62 4,813 33,808 . 38,622 229.89 .	(1) BLIP assumes all operating costs including	g a 6 opera	ator shift rotatio	n in the I	MCR.							Ш
139MeV OPS	RHIC Polarized Proton Running (2)		200MeV OPS	0.51	62	5,344	49,751	-	55,096	327.95	-	
116MeV OPS	, , , , , , , , , , , , , , , , , , ,		181MeV OPS	0.49	62	5,075	44,437	-	49,512	294.71	-	H
116MeV OPS								-			-	H
(2) assumes BLIP runs during RHIC fill and higher tube currents required for BLIP adversely affect tube lifetime compared to ^PProtons running only. NSRL Running Only (3)				0.44		4,547		-			-	Ш
(2) assumes BLIP runs during RHIC fill and higher tube currents required for BLIP adversely affect tube lifetime compared to ^PProtons running only. NSRL Running Only (3)			90MeV OPS	0.40	62	4,150	23,180	-	27,330	162.68	-	Ш
(2) assumes BLIP runs during RHIC fill and higher tube currents required for BLIP adversely affect tube lifetime compared to ^PProtons running only. NSRL Running Only (3) 200MeV OPS 2.19 62 22,851 95,512 14,136 132,499 788.68 212,687 116MeV OPS 1.53 62 15,953 73,136 14,136 103,225 614.43 177,872 90MeV OPS 1.36 62 14,158 67,542 14,136 95,836 570.45 168,961 66MeV OPS 1.19 62 12,363 61,948 14,136 88,447 526.47 160,050 (3)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers overnight and all weekend shift coverage. NSRL Running Only - No BLIP Weekends (4) 200MeV OPS 2.19 62 21,164 76,135 7,068 104,367 621.23 - PP Set-up for RHIC pays start-up cost 116MeV OPS 1.53 62 14,775 62,039 7,068 83,882 499.30 - PP Set-up for RHIC pays start-up cost 16MeV OPS 1.36 62 13,113 58,514 7,068 78,695 468.42 - PR Set-up for RHIC pays start-up for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. (4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 - 118,363 704.54 212,687 181MeV OPS 2.03 62 21,150 89,918 - 111,068 661.12 203,912 139MeV OPS 1.56 62 14,558 73,136 - 89,089 530.29 573.16 186,090 116MeV OPS 1.56 62 14,158 67,542 - 81,700 486.31 168,961 166MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 166MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 166MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 166MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 166MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 160,050 166MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 160,050 166MeV OPS			66MeV OPS	0.29	62	3,053	17,865	_	20,919	124.52	-	ПП
116MeV OPS 1.53 62 15,953 73,136 14,136 103,225 614.43 177,872 90MeV OPS 1.36 62 14,158 67,542 14,136 95,836 570.45 168,961 66MeV OPS 1.19 62 12,363 61,948 14,136 88,447 526.47 160,050 (3)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers overnight and all weekend shift coverage. NSRL Running Only - No BLIP Weekends (4) 200MeV OPS 2.19 62 21,164 76,135 7,068 104,367 621.23 -	(2) assumes BLIP runs during RHIC fill and h	igher tube	currents require	ed for BL	IP adversel	y affect tube lit	etime compared	to ^PProtons	running only.			H
116MeV OPS 1.53 62 15,953 73,136 14,136 103,225 614.43 177,872 90MeV OPS 1.36 62 14,158 67,542 14,136 95,836 570.45 168,961 66MeV OPS 1.19 62 12,363 61,948 14,136 88,447 526.47 160,050 (3)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers overnight and all weekend shift coverage. NSRL Running Only - No BLIP Weekends (4) 200MeV OPS 2.19 62 21,164 76,135 7,068 104,367 621.23 -	NSRL Running Only (3)		200MeV OPS	2.19	62	22,851	95,512	14,136	132,499	788.68	212,687	
90MeV OPS 1.36 62 14,158 67,542 14,136 95,836 570.45 168,961	, , , , , , , , , , , , , , , , , , ,		116MeV OPS	1.53		15,953	73,136	14,136	103,225	614.43	177,872	Ш
(3)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers overnight and all weekend shift coverage. NSRL Running Only - No BLIP Weekends (4) 200MeV OPS 2.19 62 21,164 76,135 7,068 104,367 621.23 - PP Set-up for RHIC pays start-up cost 116MeV OPS 1.53 62 14,775 62,039 7,068 83,882 499.30 - 90MeV OPS 1.36 62 13,113 58,514 7,068 78,695 468.42 - (4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 - 118,363 704.54 212,687 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 861.12 203,912 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050				1.36		14,158			95,836			Ш
NSRL Running Only - No BLIP Weekends (4)			66MeV OPS	1.19						526.47		Ш
PP Set-up for RHIC pays start-up cost 116MeV OPS 1.53 62 14,775 62,039 7,068 83,882 499.30 - 90MeV OPS 1.36 62 13,113 58,514 7,068 78,695 468.42 - 66MeV OPS 1.19 62 11,451 54,990 7,068 73,509 437.55 - (4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 - 118,363 704.54 212,687 181MeV OPS 2.03 62 21,150 89,918 - 111,068 661.12 203,912 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050	(3)-assumes that NSRL runs for 12 hour dayt	ime shift a	nd no weekends	s. Blip c	overs overn	ight and all we	ekend shift cove					Ш
90MeV OPS 1.36 62 13,113 58,514 7,068 78,695 468.42 - 66MeV OPS 1.19 62 11,451 54,990 7,068 73,509 437.55 - (4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 - 118,363 704.54 212,687 181MeV OPS 2.03 62 21,150 89,918 - 111,068 661.12 203,912 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050	NSRL Running Only - No BLIP Weekends	(4)	200MeV OPS	2.19	62	21,164	76,135	7,068	104,367	621.23	-	
90MeV OPS 1.36 62 13,113 58,514 7,068 78,695 468.42 - 66MeV OPS 1.19 62 11,451 54,990 7,068 73,509 437.55 - (4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 - 118,363 704.54 212,687 181MeV OPS 2.03 62 21,150 89,918 - 111,068 661.12 203,912 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050	PP Set-up for RHIC pays start-up cost		116MeV OPS	1.53	62	14,775	62,039	7,068	83,882	499.30	-	ПП
(4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 118,363 704.54 212,687 181MeV OPS 2.03 62 21,150 89,918 111,068 661.12 203,912 139MeV OPS 1.69 62 17,560 78,730 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 74,311 442.33 160,050			90MeV OPS	1.36	62	13,113	58,514	7,068	78,695	468.42	-	ПП
(4)-assumes that NSRL runs for 12 hour daytime shift and no weekends. Blip covers weekday overnight and Linac is put in save-a-watt for the weekend. RHIC Heavy Ion Running (5) 200MeV OPS			66MeV OPS	1.19	62	11,451	54,990	7,068	73,509	437.55	-	Ш
RHIC Heavy Ion Running (5) 200MeV OPS 2.19 62 22,851 95,512 - 118,363 704.54 212,687 181MeV OPS 2.03 62 21,150 89,918 - 111,068 661.12 203,912 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050	(4)-assumes that NSRL runs for 12 hour dayt	ime shift a		s. Blip c	overs week	day overnight a	and Linac is put	in save-a-watt	for the weekend			Ш
181MeV OPS 2.03 62 21,150 89,918 - 111,068 661.12 203,912 139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050				-				-			212,687	
139MeV OPS 1.69 62 17,560 78,730 - 96,290 573.16 186,090 116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050	, , , , ,							-				Ш
116MeV OPS 1.53 62 15,953 73,136 - 89,089 530.29 177,872 90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050			139MeV OPS	1.69		17,560	78,730	-	96,290	573.16	186,090	Ш
90MeV OPS 1.36 62 14,158 67,542 - 81,700 486.31 168,961 66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050			116MeV OPS	1.53				-	89,089			Ш
66MeV OPS 1.19 62 12,363 61,948 - 74,311 442.33 160,050								-				$ \mathbf{I} \mathbf{I} \mathbf{I} $
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	(5)-Blip pays all additional dedicated costs as	sociated w					,		,			$ \mathbf{I} \mathbf{I} \mathbf{I} $

2014 BLIP Operating Cost Worksheet									П
N:\BLIP & Isotope Program\FY14\[BLIP Be	am Coet Workshoot EV1	4 Final:	after rate i	norgaeg viel©i	ımmary Sconar	ine			
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	Power rate @ 9	\$56/Mwl	<u> </u>	January 2014	- February 201	4			
	Fower rate @	\$30/WW	<u>.</u>	January 2014	- 1 ebidary 201	•			
							(includes G9A)	(includes G&A)	(includes G8 A)
Operating Mode:			POWER	POWER	Maintenance	Operations	Total Weekly	(Includes GaA)	Start-up
Operating mode.		MW	\$/MWH	Cost/Week	wage&mat'l	Support	Cost	hourly cost	Cost
Dedicated Running, RHIC in "stand by"(1)	200MeV OPS	2.19	56		95,512	21,204	137,355	817.59	200.841
bedicated Rulling, Rine in Stand by (1)	139MeV OPS	1.69		15,861	78,730	21,204	115,795	689.25	176,818
	116MeV OPS	1.53			73,136	21,204	108,749	647.31	169,396
	90MeV OPS	1.36	56	12,788	67,542	21,204	101,534	604.37	161,347
	66MeV OPS	1.19		11,167	61,948	21,204	94,319	561.42	153,298
(1) BLIP assumes all operating costs includir				,	01,010	21,201	01,010	501.12	100,200
RHIC Polarized Proton Running (2)	200MeV OPS	0.51	56	4,827	49,751	-	54,579	324.87	-
rane i olarizoa i rotori ranning (2)	181MeV OPS	0.49			44,437		49,021	291.79	_
	139MeV OPS	0.46		4,347	33,808	-	38,156	227.12	_
	116MeV OPS	0.44	56	4,107	28,494	-	32,601	194.05	_
	90MeV OPS	0.40	56	3,749	23,180	_	26,928	160.29	-
	66MeV OPS	0.29		2,758	17,865	-	20,623	122.76	_
(2) assumes BLIP runs during RHIC fill and h						to ^PProtons	running only.		
NSRL Running Only (3)	200MeV OPS	2.19	56	20,639	95,512	14,136	130,287	775.52	200,841
, , ,	116MeV OPS	1.53	56	14,409	73,136	14,136	101,681	605.24	169,396
	90MeV OPS	1.36		12,788	67,542	14,136	94,466	562.30	161,347
	66MeV OPS	1.19	56	11,167	61,948	14,136	87,251	519.35	153,298
(3)-assumes that NSRL runs for 12 hour day	time shift and no weekend	s. Blip c	overs oven	night and all we	ekend shift cove	erage.			
NSRL Running Only - No BLIP Weekends	(4) 200MeV OPS	2.19	56	19,116	76,135	7,068	102,319	609.04	-
PP Set-up for RHIC pays start-up cost	116MeV OPS	1.53	56	13,345	62,039	7,068	82,452	490.79	-
	90MeV OPS	1.36	56	11,844	58,514	7,068	77,426	460.87	-
	66MeV OPS	1.19	56	10,342	54,990	7,068	72,401	430.96	-
(4)-assumes that NSRL runs for 12 hour day	time shift and no weekend	s. Blip c	overs week	day overnight	and Linac is put	in save-a-watt	for the weekend		
RHIC Heavy Ion Running (5)	200MeV OPS	2.19			95,512	-	116,152	691.38	200,841
	181MeV OPS	2.03	56	19,103	89,918	-	109,021	648.94	192,915
	139MeV OPS	1.69	56	15,861	78,730	-	94,591	563.04	176,818
	116MeV OPS	1.53	56	14,409	73,136	-	87,545	521.10	169,396
	90MeV OPS	1.36	56	12,788	67,542	-	80,330	478.16	161,347
	66MeV OPS	1.19	56	11,167	61,948	-	73,115	435.21	153,298
(5)-Blip pays all additional dedicated costs as	ssociated with Linac opera	tions and	d tube wear	and tear.					

2014 BLIP Operating Cost Worksheet									П
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N. DEIF & ISOTOPE FTOGRAMM TT4\[DEIF Be	anii Cost Worksheet	114-111101	arter rate ii	ici edse.xisjs(JWIMAKT STILL				
	Power rate	@ \$62/Mwl	1	March 2014 -	May 2014				
	Fowerrate	CE \$02/WWI	i	March 2014 -	May 2014				
							(includes COA)	(includes GRA)	(includes G&A)
Operating Mode:			POWER	POWER	Maintenance	Operations	Total Weekly	(Includes GaA)	Start-up
Operating mode.		MW	\$/MWH	Cost/Week	wage&mat'l	Support	Cost	hourly cost	Cost
Dedicated Running, RHIC in "stand by"(1)	200MeV OF			22,851	95,512	21,204	139,567	830.75	212,687
bedieded realising, relie in stand by (1)	139MeV OF			17,560	78,730	21,204	117,494	699.37	186,090
	116MeV OF		62	15,953	73,136	21,204	110,293	656.50	177,872
	90MeV OF			14,158	67,542	21,204	102,904	612.52	168,961
	66MeV OF			12,363	61,948	21,204	95,515	568.54	160,050
(1) BLIP assumes all operating costs including	g a 6 operator shift rot	ation in the		12,000	01,010	21,201	00,010	000.01	100,000
RHIC Polarized Proton Running (2)	200MeV OF		62	5,344	49,751	-	55,096	327.95	_
rano i otalizoa i roton ranning (z)	181MeV OF			5,075	44,437	_	49,512	294.71	_
	139MeV OF			4,813	33,808	_	38,622	229.89	_
	116MeV OF		62	4,547	28,494	_	33,041	196.67	- 1
	90MeV OF		62	4,150	23,180	_	27,330	162.68	_
	66MeV OF			3,053	17,865	_	20,919	124.52	_
(2) assumes BLIP runs during RHIC fill and hi						to ^PProtons			
NSRL Running Only (3)	200MeV OF				95,512	14,136	132,499	788.68	212,687
, and the same of	116MeV OF		62	15,953	73,136	14,136	103,225	614.43	177,872
	90MeV OF			14,158	67,542	14,136	95,836	570.45	168,961
	66MeV OF		62	12,363	61,948	14,136	88,447	526.47	160,050
(3)-assumes that NSRL runs for 12 hour dayti	ime shift and no week	ends. Blip o	overs over	night and all we	ekend shift cove				
NSRL Running Only - No BLIP Weekends (7,068	104,367	621.23	-
PP Set-up for RHIC pays start-up cost	116MeV OF	S 1.53		14,775	62,039	7,068	83,882	499.30	- 1
	90MeV OF			13,113	58,514	7,068	78,695	468.42	-
	66MeV OF			11,451	54,990	7,068	73,509	437.55	-
(4)-assumes that NSRL runs for 12 hour dayti	ime shift and no week	ends. Blip o	overs week	day overnight	and Linac is put	in save-a-watt	for the weekend		
RHIC Heavy Ion Running (5)	200MeV OF				95,512	-	118,363	704.54	212,687
	181MeV OF			21,150	89,918	-	111,068	661.12	203,912
	139MeV OF		62	17,560	78,730	-	96,290	573.16	186,090
	116MeV OF	S 1.53	62	15,953	73,136	-	89,089	530.29	177,872
	90MeV OF	S 1.36	62	14,158	67,542	-	81,700	486.31	168,961
	66MeV OF			12,363	61,948	-	74,311	442.33	160,050
(5)-Blip pays all additional dedicated costs as	sociated with Linac op	erations and	tube wear	and tear.					

2014 DLID Operating Cost Workshoot						I				т
2014 BLIP Operating Cost Worksheet N:\BLIP & Isotope Program\FY14\[BLIP Be	am Coat Workshoot EV4	4 Final a	ofter rate in	arrages visits	ımmanı Caanar	ioo				$+\!\!+\!\!\!+$
N:\BLIP & ISOtope Program\F 114\[BLIP Be	am Cost Worksneet F Y 1	4-Final a	arter rate ir	icrease.xisjst	immary Scenar	ios				$+\!\!+\!\!\!+$
										$+\!\!+\!\!\!+$
	Dawes and O	**************************************		l 2044 C						$+\!\!+\!\!\!+$
	Power rate @ 9	\$/4/WWF	1	June 2014 - 5	eptember 2014					$+\!\!+\!\!\!+$
										$+\!\!+\!\!\!+$
										Ц
							(includes G&A)	(includes G&A)	(includes G&A)	4
Operating Mode:			POWER	POWER	Maintenance	Operations	Total Weekly		Start-up	Щ
		MW	\$/MWH	Cost/Week	wage&mat'l	Support	Cost	hourly cost	Cost	Щ
Dedicated Running, RHIC in "stand by"(1)		2.19	74		95,512	21,204	143,989	857.08	236,379	
	139MeV OPS	1.69	74		78,730	21,204	120,893	719.60	204,634	
	116MeV OPS	1.53	74		73,136	21,204	113,380	674.88	194,826	
	90MeV OPS	1.36	74		67,542	21,204	105,644	628.83	184,190	
	66MeV OPS	1.19	74	14,756	61,948	21,204	97,908	582.79	173,554	Ш
(1) BLIP assumes all operating costs including	g a 6 operator shift rotatio	n in the I	MCR.							Ш
RHIC Polarized Proton Running (2)	200MeV OPS	0.51	74	6,379	49,751	-	56,130	334.11	-	П
	181MeV OPS	0.49	74		44,437	-	50,494	300.56	-	П
	139MeV OPS	0.46	74	5,745	33,808	-	39,553	235.44	-	П
	116MeV OPS	0.44	74	5,427	28,494	-	33,921	201.91	-	П
	90MeV OPS	0.40	74	4,953	23,180	-	28,133	167.46	-	П
	66MeV OPS	0.29	74	3,644	17,865	-	21,510	128.03	-	П
(2) assumes BLIP runs during RHIC fill and h	igher tube currents require	ed for BL	IP adverse	ly affect tube lif	etime compared	to ^PProtons	running only.			\top
NSRL Running Only (3)	200MeV OPS	2.19	74	27,273	95,512	14,136	136,921	815.01	236,379	П
, , ,	116MeV OPS	1.53	74		73,136	14,136	106,312	632.81	194,826	
	90MeV OPS	1.36	74		67,542	14,136	98,576	586.76	184,190	
	66MeV OPS	1.19	74		61,948	14,136	90,840	540.71	173,554	
(3)-assumes that NSRL runs for 12 hour days	time shift and no weekend	s. Blip c	overs over	night and all we	ekend shift cove		,		,	\forall
NSRL Running Only - No BLIP Weekends		2.19	74	_	76,135	7,068	108,464	645.62	-	Ħ
PP Set-up for RHIC pays start-up cost	116MeV OPS	1.53	74		62,039	7,068	86,741	516.32	-	⇈
r r oot up for fame paye otant up ooot	90MeV OPS	1.36	74		58,514	7,068	81,233	483.53	_	+
	66MeV OPS	1.19	74		54,990	7,068	75,725	450.74	_	╫
(4)-assumes that NSRL runs for 12 hour days							for the weekend			#
RHIC Heavy Ion Running (5)	200MeV OPS	2.19	74		95,512		122,786	730.87	236,379	₩
rano rioury ion randing (o)	181MeV OPS	2.03	74		89,918	-	115,161	685.48	225,906	
	139MeV OPS	1.69	74		78,730	-	99,689	593.39	204,634	
	116MeV OPS	1.53	74		73,136	-	92,177	548.67	194,826	
	90MeV OPS	1.36	74		67,542		84,440	502.62	184,190	
	66MeV OPS	1.19	74		61,948	-	76,704	456.57	173,554	
(5)-Blip pays all additional dedicated costs as				,	01,340	-	10,104	430.37	173,334	╫
(5)-Diip pays ali additional dedicated costs as	sociated with Linat Opera	uono and	rube wear	and tear.						

FY 2014 BLIP Cost Estimate

31-Dec-13 28-Feb-14	-	Mode	Energy (MeV)		t/hour	Tota	l	S. Smith Pres	
28-Feb-14	2.0				t/hour	Tota		Slide 38 (CM	actual cost)
28-Feb-14		рр	116					211212 30 (0111	uctual costy
	8.4		110	\$	196.67	\$	66,081		
24.84.44	0	рр	116	\$	194.05	\$	274,775		
31-Mar-14	4.4	рр	116	\$	196.67	\$	146,322		
31-May-14	8.7	HI	116	\$	530.29	\$	776,345		
4-Jul-14	4.9	HI	116	\$	548.67	\$	447,715		
31-Jul-14	3.7	Dedicated	116	\$	674.88	\$	421,125		
	32.1					\$	2,132,363		
r 140-200 MeV	4		200	\$	120.00	\$	80,640		
							2 242 002	¢2 202 472	
	31-May-14 4-Jul-14 31-Jul-14	31-May-14 8.7 4-Jul-14 4.9 31-Jul-14 3.7 32.1	31-May-14 8.7 HI 4-Jul-14 4.9 HI 31-Jul-14 3.7 Dedicated 32.1	31-May-14 8.7 HI 116 4-Jul-14 4.9 HI 116 31-Jul-14 3.7 Dedicated 116 32.1	31-May-14 8.7 HI 116 \$ 4-Jul-14 4.9 HI 116 \$ 31-Jul-14 3.7 Dedicated 116 \$ 32.1	31-May-14 8.7 HI 116 \$ 530.29 4-Jul-14 4.9 HI 116 \$ 548.67 31-Jul-14 3.7 Dedicated 116 \$ 674.88	31-May-14 8.7 HI 116 \$ 530.29 \$ 4-Jul-14 4.9 HI 116 \$ 548.67 \$ 31-Jul-14 3.7 Dedicated 116 \$ 674.88 \$ \$	31-May-14 8.7 HI 116 \$ 530.29 \$ 776,345 4-Jul-14 4.9 HI 116 \$ 548.67 \$ 447,715 31-Jul-14 3.7 Dedicated 116 \$ 674.88 \$ 421,125 32.1 \$ 2,132,363	31-May-14 8.7 HI 116 \$ 530.29 \$ 776,345 4-Jul-14 4.9 HI 116 \$ 548.67 \$ 447,715 31-Jul-14 3.7 Dedicated 116 \$ 674.88 \$ 421,125 32.1 \$ 2,132,363